



AVOIDING DANGEROUS CLIMATE CHANGE

DEFINING AUSTRALIA'S CARBON BUDGET

Summary

Background

- Australia has made an international commitment to reduce emissions by at least 5% below 2000 levels by 2020, and to lift this to 25% as our fair contribution to the globally agreed goal of limiting global warming to no more than 2 degrees Celsius above pre-industrial levels. A final decision on the 2020 target, as part of our commitment to the Kyoto Protocol, is expected in the first half of 2014.
- To be credible on the international stage Australia's target must be consistent with the goal of limiting global warming to no more than 2 degrees Celsius above pre-industrial levels.
- WWF-Australia commissioned leading consulting firm, Ecofys, to assess what would be considered a reasonable and credible contribution from Australia towards the 2 degrees goal.

Key Findings

- Australia has already "spent" at least two-thirds of what would be considered a reasonable carbon budget that is consistent with keeping global warming below 2 degrees. If annual emissions remain at their current level, the entire budget would be used up in a little over a decade, if not sooner.
- Australia's existing unconditional goal of reducing emissions by 5 per cent below 2000 levels by 2020 falls well short of a credible contribution to the 2 degrees goal.
- To be considered fair and equitable by other countries Australia would need to commit to reducing emissions somewhere in the range of 27 to 34 per cent below 2000 levels by 2020, with much deeper targets required in the subsequent decades.

Recommendation

- As a bare minimum, the federal government should be willing to immediately move to the upper end of its existing 2020 target range. This would see Australia's emissions reduced by 25 per cent below 2000 levels by the end of this decade.

Introduction

Australia has made an international commitment to reduce greenhouse gas emissions by between 5 and 25 per cent below 2000 levels by 2020; a target range that has received bipartisan support since 2009.¹ In addition to the internationally pledged 2020 target range, the Australian Parliament has also passed legislation requiring emissions to be reduced by 80 per cent below 2000 levels by 2050.

This term of government is likely to see three key decisions on emissions targets:

- i. In the first half of 2014 as part of the Kyoto Protocol, the Government will need to make a decision on the final 2020 target, as opposed to a target range;
- ii. During the upcoming parliamentary debate on the future of the carbon price laws, the Parliament will need to decide whether or not the existing 2050 target will be retained; and
- iii. By early 2015 the international community will begin negotiations on mid-term targets (possibly 2030) to be committed to as part of the post-2020 global climate agreement, which is due to be finalised at the end of 2015.

These decisions will determine Australia's contribution to global efforts to tackle climate change over the coming decades and will therefore require a judgement of what constitutes Australia's "fair share" of the global effort needed to avoid dangerous climate change.

Internationally, there is a growing expectation that national targets should be based on a transparent assessment of the long-term global "carbon budget" – the maximum cumulative emissions that can be released into the atmosphere over the coming decades to retain a reasonable chance of avoiding dangerous climate change. Many countries are using the carbon budget approach to identify their share of the global budget and the corresponding emission reduction targets they should set to stay within their long-term carbon budget.

Using a global carbon budget consistent with the goal of limiting global warming to no more than 2°C above pre-industrial levels, this policy brief draws on new research by international consulting firm, Ecofys, to examine what Australia's carbon budget should be and assesses the possible implications for Australia's 2020, 2030 and 2050 emission reduction targets.

The need for stronger action

According to the [Intergovernmental Panel on Climate Change \(IPCC\) Fifth Assessment Report](#), the global average air temperature has increased by approximately 0.85°C since 1890.ⁱ By the end of this century, the IPCC projects that warming is likely to exceed 1.5°C, with the possibility of the global average temperature rising by as much as 5.4°C compared to pre-industrial levels.ⁱⁱ

Exactly how much warming occurs will depend on the efforts to curtail global greenhouse gas emissions. According to the World Bank, if countries fail to implement stronger emission reduction policies, the global average temperature is likely to rise by more than 3°C above pre-industrial levels, with a possibility that 4°C of warming will be experienced this century.ⁱⁱⁱ

It is widely accepted that amongst developed countries Australia has the most to lose from ongoing climate change^{iv}, with significant impacts on agriculture and tourism industries, coastal communities, human health and our unique wildlife and places. For example, scientists predict that a 1.5°C global temperature rise may see 25 per cent of the Earth's animals and plants disappear; a 3°C rise may see 30 per cent disappear.^v This would be a significant loss to the world and Australia, which can't be measured in monetary terms.

¹ Bipartisan support was originally provided by Malcolm Turnbull (<http://www.abc.net.au/news/2009-05-26/opposition-delivers-carbon-trade-ultimatum/1694670>) and was subsequently re-affirmed by Tony Abbott (<http://www.theaustralian.com.au/news/tony-abbott-stumbles-forced-to-restate-support-for-emissions-targets/story-e6frg6n6-1225806271993>). Since the 2013 election, the Environment Minister has again re-affirmed the Government's commitment to the range (<http://www.abc.net.au/lateline/content/2013/s3854893.htm>).

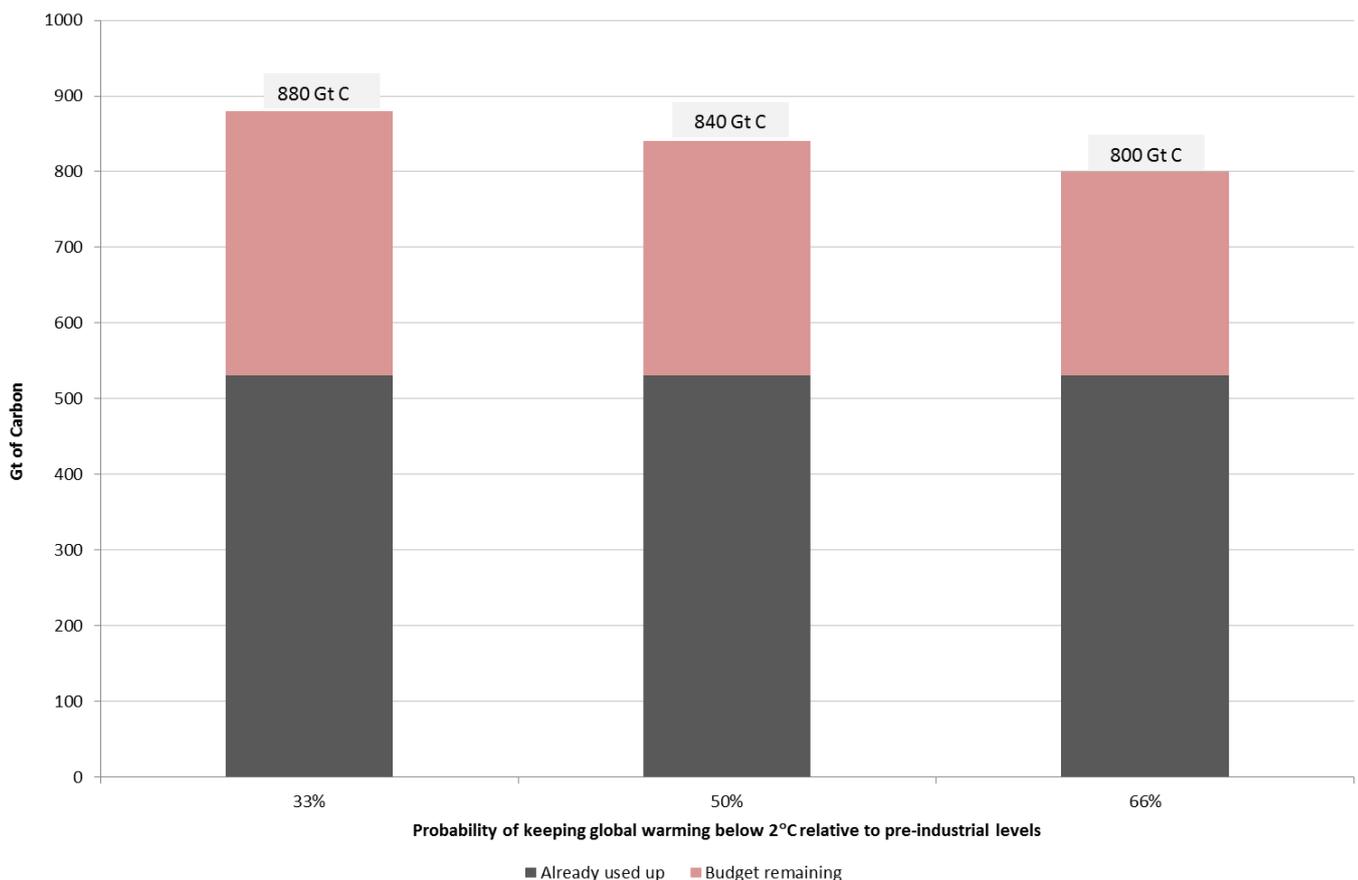
Defining a global climate budget to avoid dangerous climate change

The international community has committed to the goal of limiting global warming to no more than 2°C above pre-industrial levels. Recognising that even this level of warming would have unacceptable consequences for many countries, the international community has also agreed to review the adequacy of the 2°C goal in 2015 and to consider moving to a 1.5°C goal, which would require even greater emission cuts.^{vi}

The IPCC's *Fifth Assessment Report* includes an estimate of the maximum cumulative emissions that can be released into the atmosphere over the coming decades to limit global warming to below 2°C; otherwise known as the global "carbon budget". The IPCC includes three long-term global carbon budgets, with the most generous budget assuming only a 33 per cent probability of staying below 2°C and the strictest budget providing a 66 per cent probability. The results are summarised in Figure 1.

The IPCC analysis confirms that current rates of global emissions are entirely inconsistent with the long-term goal of keeping global warming below 2°C. Indeed, if we aim to retain a 50 per cent chance of staying below 2°C, then around 63 per cent of the long-term global carbon budget has already been used up. If annual rates of global emissions remain at current levels, the entire remaining carbon budget is likely to be consumed within the next 23 years.²

Figure 1 Global carbon budget allowed if we are to limit global warming to below 2°C (Source: IPCC (2013), *Climate Change 2013: The Physical Science Basis*, Working Group I Contribution to the Fifth Assessment Report of the IPCC, <http://www.ipcc.ch/report/ar5/wg1/#.UmR7cPlpf1A>.)



² Assumes annual global emissions of 48.6 Gt CO₂-e (<http://www.ecofys.com/files/files/asn-ecofys-2013-world-ghg-emissions-flow-chart-2010.pdf>)

If we were to spread the global carbon budget out to the end of the century, global emissions would need to be *immediately* cut to around one quarter of current levels. Since such an immediate and drastic cut in global emissions would be impossible to achieve. The challenge is to find a more realistic “pathway” for global emissions. In a study commissioned by WWF in 2009, leading international consulting firm, Ecofys, concluded that to stay within long-term global carbon budget consistent with 2°C, global emissions will need to fall by 50 per cent by 2030 and by 94 per cent by 2050, compared to 1990 levels.^{vii}

Sharing the effort between countries

While it may be relatively straightforward to define a long-term global carbon budget consistent with keeping global warming below 2°C, the big challenge for the international community will be to reach agreement on how this global budget should be distributed between countries. Indeed, the allocation of the global carbon budget between countries remains a central stumbling block in the international negotiations.

While it would be naïve to believe that the international community will be able to agree on a single formula for sharing the global carbon budget, there is no doubt that countries will only be willing to accept international emission reduction targets if they believe these targets are fair. If a country believes the target they are being asked to adopt is too stringent in comparison to the target of its competitors, they are likely to resist and may even opt out.

The 2009 Ecofys study commissioned by WWF International assessed three approaches to distributing the long-term global carbon budget between countries, which are briefly explained in Table 1 below. A more detailed description of the three approaches is provided in the [Ecofys report](#).^{viii}

The three effort sharing approaches considered by Ecofys are being considered by countries as part of the UNFCCC process, but are not the only options that have been developed. They are, however, considered to be three of the most credible approaches because they place a strong emphasis on the issue of equity. Ensuring the global carbon budget is shared equitably between countries is the central challenge facing the UN climate negotiations.

It is important to note that Ecofys’ analysis focusses on global carbon allocations, as opposed to actual domestic emissions. It is assumed that countries will and should be able to purchasing abatement from overseas to stay within their national carbon budget. Using international abatement can significantly lower the overall economic cost of achieving Australia’s emission reduction targets.

Table 1: Description of the effort sharing approaches assessed by Ecofys

Effort sharing approach	Description
Contraction and convergence (C&C)	Under this approach <i>all</i> countries agree to immediately bring their per capita emissions to the same agreed level over the coming decades, ensuring that their cumulative emissions do not exceed the total global carbon budget. This approach allows for some countries to increase their per capita emissions, recognising that they currently have very low per capita emissions and high levels of poverty. But the key feature of this approach is that all countries commit to a specific per capita threshold and immediately start bringing their emissions to that level.
Common but differentiated convergence (CDC)	This approach also requires countries to converge at the same per capita emissions levels. However, unlike the previous approach, developing countries are only required to commit to a specific target once their per capita emissions meet a specific threshold. This allows for some differentiation between countries based on their per capita emissions, levels of development and historic responsibility for contributing to global emissions.
Greenhouse development rights (GDR)	This approach shares the global emissions budget between countries according to two key factors: capacity (income); and responsibility (for emissions since 1990). These two data sets are combined to calculate each countries share of the global carbon budget, with wealthy, high polluting countries receiving a much smaller share of the budget than poorer, less polluting countries.

Australia's carbon budget and implications for 2020, 2030 and 2050 targets

WWF-Australia recently commissioned Ecofys to update their 2009 analysis and to define possible long-term carbon budgets for Australia, based on the three effort sharing approaches listed in Table 1. The key findings of the Ecofys analysis are presented below, with a more detailed presentation of the results provided in a technical annex to this policy brief.³

As shown in Table 2, Australia has already used between 66 per cent and 84 per cent of its 'fair share' of the global carbon budget, depending on the effort sharing approach applied. At current rates of emissions the remaining budget would be consumed within the next 4 to 11 years.

Table 2: Budget allocated, used and remaining according to Ecofys analysis (excluding land use change and forestry)

Effort sharing approach	Total budget allocated to Australia (1990-2100) Gt CO ₂ -e	Budget used (1990-2012) Gt CO ₂ -e	Budget remaining (2013-2100) Gt CO ₂ -e	How long will the budget last at current rates of emissions?
Contraction and convergence	18.0	11.7	6.1	11 years
Common but differentiated convergence	17.6	11.7	5.7	10.5 years
Greenhouse development rights	14.1	11.7	2.3	4 years

When the carbon budgets are converted to potential emissions pathways the Ecofys analysis highlights the inadequacy of Australia's existing target commitments (Table 3). Only the upper end of the 5-25 per cent range for 2020 comes close to what the Ecofys analysis suggests would be required from Australia as a fair contribution to staying below 2°C. Moreover, an 80 per cent target for 2050 falls well short of what would be required to stay within Australia's long-term carbon budget.

Assuming a straight-line emissions trajectory and excluding forestry related emissions and removals (i.e. afforestation, reforestation and deforestation), the Ecofys analysis implies a carbon allocation in the range of 27 per cent to 34 per cent below 2000 levels by 2020. Even under the least stringent effort sharing approach, Australia's allocation of emissions falls to 82 per cent below 2000 levels by 2030, while the GDR methodology implies net negative emissions by 2030. Under all three scenarios Australia's emissions allocation is close to or below zero by 2050.⁴

³ The Ecofys analysis uses a global carbon budget of 1,800 Gt CO₂-e for the period 1990-2100, excluding land use, land use change and forestry (LULUCF). This global carbon budget is consistent with stabilising atmospheric greenhouse gas concentrations at around 450 parts per million (ppm) CO₂-e. If LULUCF is included, the global budget is reduced to 1,600 Gt CO₂-e over the period 1990-2100.

⁴ The Ecofys analysis excludes emissions and removals from afforestation, reforestation and deforestation, whilst Australia's emissions target includes forestry related emissions and removals. According to the Australian Government, net emissions from afforestation, reforestation and deforestation are projected to remain broadly stable out to 2020 (i.e. will not rise significantly from the current level). If the Government's projections are used, the implied emissions cuts for 2020 do not vary significantly from Ecofys' analysis of emissions trajectories that exclude forestry emissions and removals (28 – 35 per cent below 2000 levels, including afforestation, reforestation and deforestation). It is important to note that Ecofys and others argue that net emissions from afforestation, reforestation and deforestation are more likely to decline to zero by 2020, driven mostly by a significant decline in deforestation emissions. While it could be argued that this additional abatement in the land sector would simply free up more of the carbon budget for other sectors of the economy, it could also be used to top-up Australia's overall 2020 target.

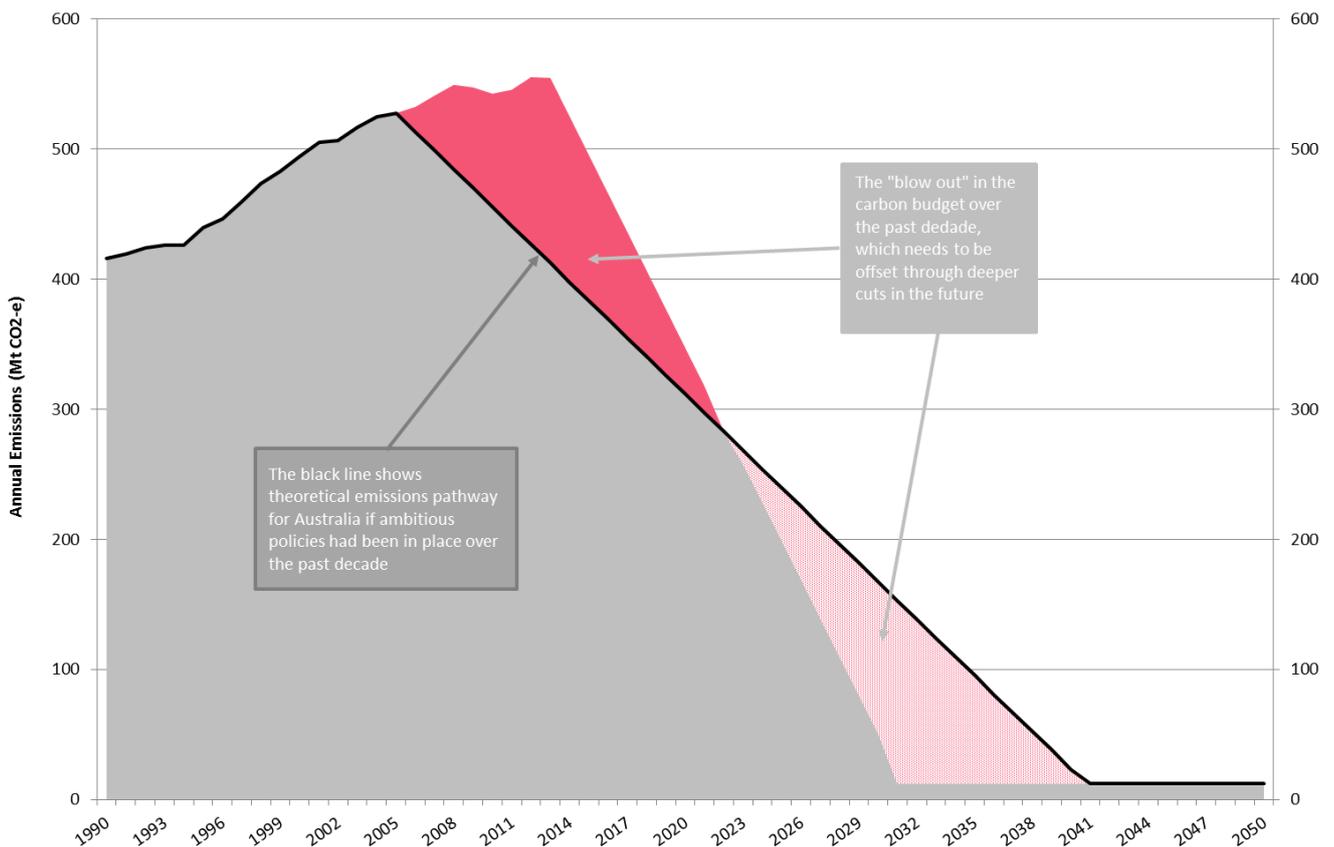
Table 3: Comparison of Australia’s existing targets and those implied by the Ecofys analysis

Time period	Australia’s existing targets % below 2000 levels	Targets implied by Ecofys analysis % below 2000 levels
2020	5 – 25%	27 – 34%
2030	No target	82 – 101%
2050	80%	98 – 106%

The Ecofys results are slightly more stringent than advocated by the Garnaut Climate Change Review in 2008. Using a methodology similar to Ecofys’ contraction and convergence scenario, Garnaut concluded that Australia would need to reduce its emissions by 25 per cent below 2000 levels by 2020 and 90 per cent below 2000 levels by 2050 in order to do its fair share of the global effort required to stay below 2°C.^{ix} In 2007, the IPCC concluded that developed countries as a group (including Australia) will need to reduce emissions by 25 to 40 per cent below 1990 levels by 2020 to stay within the 2°C guardrail.^x

While in theory it could be possible for Australia to adopt a relatively weak 2020 target and make this up by adopting much stricter targets in the future, this approach may lack credibility, as it would imply unrealistically deep targets in the post-2020 period. The problem with delaying action to reduce emissions is illustrated in Figure 2, which shows that the failure to reduce emissions over the past decade has significantly increased the stringency of the abatement challenge for the coming decade.

Figure 2: Emissions pathways to stay within the long-term carbon budget and the impact of delay (source: Ecofys analysis).

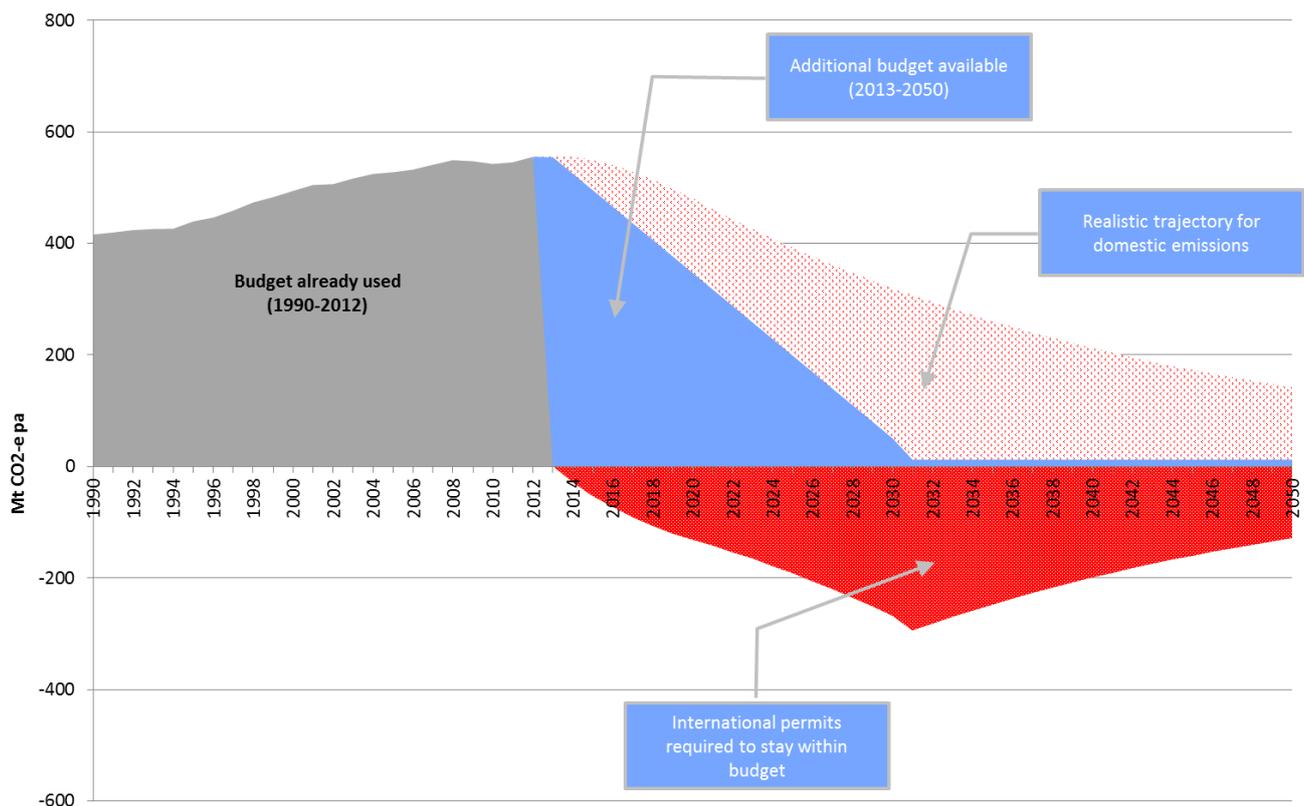


Options to balance the budget

Australia does not have to stay within the long-term carbon budget through domestic abatement alone. Indeed, Ecofys found that even if emissions were reduced by 4 per cent each year (assumed to be the upper limit of what is currently possible) Australia would still significantly exceed its emissions budget. It is conceivable that in the long-term this budget shortfall could be made up (at least partially) through the deployment of technologies that have negative emissions (e.g. electricity generation from biofuel with carbon capture and storage). However, in the short-term purchasing abatement from overseas will be required.

Figure 3 provides an illustration of how Australia could balance its carbon budget through a combination of ambitious abatement efforts domestically and annual purchases of overseas abatement. International permits can be imported either via a direct government purchase, or by adopting a stronger cap under an emissions trading scheme. While the use of international permits does displace domestic abatement activities, it also helps to lower the overall cost of achieving targets. Providing the international permits are credible (i.e. they do represent a tonne of abatement), then the overall economic efficiency of Australia's response to climate change can be significantly improved, without compromising environmental effectiveness.

Figure 3: Options for balancing the budget. The light blue area shows the total long-term carbon budget available to Australia under the CDC effort sharing option. The pink shaded area shows the annual overshoot of the carbon budget if Australia adopts an ambitious, but technically achievable pathway for domestic abatement (cuts of 4 per cent p.a.). The red area shows how much abatement will need to be purchased from overseas each year in order to balance the budget. Emissions and removals from afforestation, reforestation and deforestation are included here.



Australia's current position

In May 2009 the Australian Government announced a 2020 target range for greenhouse gas emissions, along with specific conditions that would need to be met to strengthen the targets.⁵ This decision to adopt a target range, instead of a single number, was based on the view that Australia needed to maintain some flexibility to respond to international developments. The aim was to send a signal to the international community that Australia would be willing to adopt stronger targets if other countries made similar commitments.

The 5 to 25 per cent target range has subsequently been inscribed in three separate international agreements: the Copenhagen Accord (a non-binding political declaration); the Cancun Agreements (a set of formal UN decisions); and the Kyoto Protocol (a binding international treaty). Australia has joined close to 100 developed and developing countries (including China and the US) that have set international 2020 emission targets, representing 80 per cent of global emissions and 90 per cent of the world's economy.^{xi}

The Australian Parliament has passed the *Clean Energy Act* which sets a 2050 emissions target (80 per cent below 2000 levels).

The current Government has said it is committed to the 5 to 25 per cent target range and associated conditions for strengthening the target.^{xii}

The independent Climate Change authority has been tasked with making recommendations on Australia's carbon budget and targets. Its draft report is due at the end of October 2013 and final report due in February 2014.

How does Australia's target range compare?

The minimum 5 per cent target was recommended by Garnaut in 2008 as a holding position until there was more certainty about the commitments from other countries. Since then, Garnaut^{xiii} and others such as ANU Professor Frank Jotzo,^{xiv} have argued that things have progressed sufficiently at the international level to warrant lifting Australia's minimum target.

Analysis by the Environment Department (formerly the Department of Climate Change and Energy Efficiency) supports the view that, given the actions being taken other nations, Australia should be prepared to commit to at least a 10-15 per cent emissions reduction target. Significantly, the Department's analysis also concluded that China's emissions target is consistent with the conditions for Australia's 25 per cent emissions target.^{xv}

Most recently, Garnaut has argued that Australia should be willing to at the very least match the US goal of reducing emissions by 17 per cent below 2005 levels by 2020 (equivalent to 21 per cent below 2000 levels).^{xvi}

Both the ALP and the Coalition have made it clear that Australia's final 2020 target should be set after considering what progress is being made internationally. Below is a brief snapshot of progress that has been achieved since 2009 when Australia's 5-25 per cent target range was first set.

- Close to 100 countries have now pledged international emission reduction commitments for 2020, including all major economies and the world's largest emitters. Together these countries account for 80 per cent of global emissions.
- **China** – the world's largest emitter, second largest economy and Australia's largest trading partner – has agreed to reduce the emissions intensity of its economy by 40 -45 per cent below 2005 levels by 2020. China has begun implementing this target through domestic law as part of its current Five Year Plan (2011-2015), which includes a target to reduce the emissions intensity of its economy by 17 per cent below 2005 levels by 2015. China's 2020 target is consistent with Australia taking on a 25% target.^{xvii}
- The **USA** – the world's second largest emitter, largest economy and Australia's third largest trading partner – has committed to reduce its emissions by 17 per cent below 2005 levels by 2020. Earlier this

⁵ The conditions can be viewed here:

http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/australiacphaccord_app1.pdf

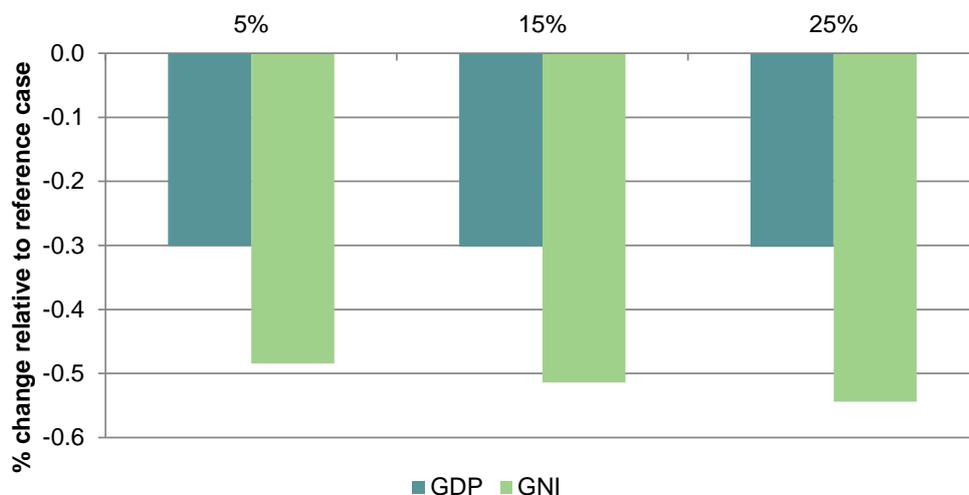
year President Obama outlined a plan to achieve this target, which includes a series of new regulations under the Clean Air Act. The US 2020 target is equivalent to Australia taking a 21% target for 2020.^{xviii}

- **India** has committed to reducing the emissions intensity of its economy by 20 – 25 per cent below 2005 levels by 2020 and in recent years has launched a series of ambitious policies to deploy renewable energy.
- The **UK** was the first country to set legally-binding emissions reduction targets (34 per cent below 1990 levels by 2020 and 80 per cent below 1990 levels by 2050). The UK has also adopted a series of legally-binding five year carbon budgets stretching out to 2027. To stimulate investment in its own low carbon sectors, in 2013 the UK Government introduced a carbon price floor, which equates to approximately \$26 per tonne.
- **Germany** has set a target to reduce emissions by 40 per cent below 1990 levels by 2020 and up to 95 per cent by 2050.
- **Japan** – Australia’s second largest trading partner – has pledged to reduce its emissions by 25 per cent below 2000 levels by 2020. This target is now under review, given the country’s challenges in the aftermath of the Tsunami. Significantly, despite the challenges, Japan has remained committed to renewable energy, introducing a world leading feed-in tariff, which is expected to deliver a six-fold increase in solar capacity by 2020.^{xix}
- **South Korea**, Australia’s third largest export market, has committed to reducing emissions by 30 per cent below the expected business as usual growth levels. To put this into perspective, South Korea’s emissions are about the same as Australia’s, but they plan to be saving 50 per cent more carbon pollution by the end of this decade than would be saved by Australia’s minimum 5 per cent target. South Korea has also passed legislation to begin an emissions trading scheme from 2015.
- **South Africa** – the world’s fifth largest coal exporter – has committed to reducing its emissions by 34 per cent below projected business as usual levels. Importantly, South Africa is also in the process of implementing a national carbon tax as a central tool for reducing emissions.
- **Indonesia** has committed to reduce its emissions by 26 – 41 per cent below projected business as usual levels.
- In April 2012, **Mexico’s** parliament unanimously passed a national climate change law, including a legally binding target to reduce Mexico’s emissions by 50 per cent by 2050.

What are the economic implications of a stronger target?

Recent modelling by Vivid Economics and Monash University found that the economic cost of achieving Australia’s unconditional 5 per cent target is now 75 per cent lower than when this target received bipartisan endorsement back in 2009. This same modelling found that moving from a 5 per cent target to a 25 per cent target can be achieved at almost no additional impact on Gross Domestic Product (GDP) (0.01 per cent) and around a 0.06 per cent impact on Gross National Income (Figure 4). This modelling assumed that an internationally linked emissions trading scheme is the primary policy tool used to achieve emissions targets.

Figure 4: Economic costs of Australia moving to a stronger 2020 emissions target (Vivid Economics based on modelling results from CoPS MMRF).^{xx}



WWF-Australia’s position

WWF-Australia believes it is in Australia’s national interest to immediately move to stronger emission reduction targets. This will send a powerful signal to the international community that we are prepared to do our fair share of the global effort required to avoid dangerous climate change. Conversely, to retain a weak target would send a signal to the international community that Australia is not serious about keeping global warming below 2°C, undermining efforts to secure a more ambitious international agreement.

Specifically, we are calling for the Government to commit to the following targets, all of which should be achieved through a mix of domestic action and international trading:

- **2020:** As a bare minimum, the federal government should be willing to immediately move to the upper end of its existing 2020 target range. This would see Australia’s emissions reduced by 25 per cent below 2000 levels by the end of this decade.
- **2030:** Commit to a 2030 target that is consistent with a fair and equitable long-term carbon budget. The Ecofys analysis implies a target of at least 80 per cent below 2000 levels by 2030, to be achieved through a mix of domestic and international action.
- **2050:** Retain a 2050 target and strengthen it to ensure it is consistent with a long-term carbon budget for Australia. The Ecofys analysis implies that Australia should be aiming for zero net emissions by 2050.

Annex: Ecofys Technical Report

The full Ecofys Technical Report used as the basis for the analysis presented in this policy brief can be downloaded from wwf.org.au.

Notes:

ⁱ IPCC (2013) *Climate Change 2013: The Physical Science Basis, Summary for Policy Makers*, Working Group I Contribution to the IPCC Fifth Assessment Report, http://www.climatechange2013.org/images/uploads/WGIAR5-SPM_Approved27Sep2013.pdf

ⁱⁱ Ibid. Note, these figures are relative to the period 1850-1900.

ⁱⁱⁱ World Bank (2012) *Turn Down the Heat: Why 4 °C Warmer World Must be Avoided*, <http://www.worldbank.org/en/news/press-release/2012/11/18/new-report-examines-risks-of-degree-hotter-world-by-end-of-century>

^{iv} Garnaut (2011) Carbon Pricing and Reducing Australia's Emissions. Climate Change Review Update 2011: Update paper 6, pg.6. <http://www.garnautreview.org.au/update-2011/update-papers/up6-carbon-pricing-and-reducing-australias-emissions.pdf>

^v IPCC (2007) Fourth Assessment Report. Working Group II: Impacts, Adaptation and Vulnerability http://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch19s19-3-4.html

^{vi} Conference of the Parties to the United Nations Framework Convention on Climate Change (2010), *The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention*, Decision 1/CP.16, <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2>

^{vii} Hohne, N. and Moltmann, S. (2009), *Sharing the effort under a global carbon budget*, Ecofys, commissioned by WWF-International, http://www.ecofys.com/files/files/wwf_ecofyscarbonbudget.pdf.

^{viii} Hohne, N. and Moltmann, S. (2009), *Sharing the effort under a global carbon budget*, Ecofys, commissioned by WWF-International, http://www.ecofys.com/files/files/wwf_ecofyscarbonbudget.pdf.

^{ix} Garnaut, R. (2008), *Garnaut Climate Change Review*, <http://www.garnautreview.org.au/2008-review.html>

^x IPCC (2007), *Climate Change 2007: Mitigation of Climate Change*, contribution of Working Group III to the Fourth Assessment Report of the IPCC, http://www.ipcc.ch/publications_and_data/ar4/wg3/en/contents.html

^{xi} <http://www.climatechange.gov.au/international/actions/countries-acting-now/international-pledges>

^{xii} Greg Hunt on Lateline, 23 September 2013, <http://www.abc.net.au/lateline/content/2013/s3854893.htm> .

^{xiii} Garnaut, R (2011), Australia in the Global Response to Climate Change: Summary, <http://www.garnautreview.org.au/update-2011/garnaut-review-2011/summary-20June.pdf>

^{xiv} Jotzo, F. (2010), "Copenhagen targets and Australia's climate commitment", Polity Brief, Centre for Climate Economics & Policy, ANU,

^{xv} The Climate Institute (2010), "Summary of Freedom of Information Request from The Climate Institute to the Department of Climate Change and Energy Efficiency: Documents regarding the influence of foreign emission reduction targets on Australia's emission reduction targets", Media Brief, November 2010, http://www.climateinstitute.org.au/verve/resources/foi_request_summary.pdf

^{xvi} Comments made during Grattan Institute event: <http://www.climatechange.gov.au/reducing-carbon/reducing-australias-emissions/australias-emissions-projections>

^{xvii} The Climate Institute (2010), "Summary of Freedom of Information Request from The Climate Institute to the Department of Climate Change and Energy Efficiency: Documents regarding the influence of foreign emission reduction targets on Australia's emission reduction targets", Media Brief, November 2010, http://www.climateinstitute.org.au/verve/resources/foi_request_summary.pdf

^{xviii} World Resources Institute (2012), *GHG Mitigation in the United States: An overview of the current policy landscape*, http://www.wri.org/sites/default/files/pdf/ghg_mitigation_us_policy_landscape_overview.pdf

^{xix} <http://reneweconomy.com.au/2012/iea-says-renewable-energy-growth-to-accelerate-76483>

^{xx} Vivid Economics (2013), *The costs and benefits of greater Australian emissions reduction ambition*, report prepared for WWF Australia, <http://www.wwf.org.au/?7020/Go-deeper-for-cheaper>